

The glue that binds us all: The Science of the Electron-Ion Collider

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The Electron-Ion Collider (EIC) under construction at Brookhaven National Laboratory will explore in detail the quantum world of quarks and gluons at distance scales less than a trillionth the width of a strand of hair. Though gluons are massless, and quarks nearly so, the emergent dynamics of these elementary objects in Quantum Chromodynamics (QCD) describes the vast bulk of the mass of the visible universe. Despite significant developments in our understanding of QCD, many of the details of quark-gluon dynamics remain deeply mysterious. We will discuss some of the outstanding questions that remain and outline how finely resolved multi-dimensional images extracted from high energy electron-ion collisions at the EIC can lead to fundamental insight into the glue that binds us all. In particular, we will highlight some of the interdisciplinary connections of this science across energy scales, from the physics of primordial black holes and the early universe, to the dynamics of ultracold atoms.

Abstract Category

Nuclear Physics

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